

What is claimed is:

1. A process for sintering polyethylene having a weight average molecular weight of more than 1,000,000 g/mol, said process comprising:
  - (a) at least partly disentangling said polyethylene;
  - (b) heating the at least partly disentangled polyethylene to a temperature between room temperature and the crystalline melting temperature of the polyethylene;
  - 10 (c) compacting the at least partly disentangled polyethylene at a temperature between room temperature and the crystalline melting temperature of the polyethylene;
  - (d) heating the compacted polyethylene to a temperature above its crystalline melting temperature;
  - 15 (e) cooling the polyethylene to a temperature below its crystalline melting temperature.
2. The process of claim 1, wherein said at least partly disentangling is effected by a process comprising swelling said polyethylene.
- 20 3. The process of claim 1, wherein said weight average molecular weight is more than 2,000,000 g/mol.
4. The process of claim 1, wherein said weight average molecular weight is  
25 more than 5,000,000 g/mol.

5. The process of claim 1, wherein said weight average molecular weight is more than 10,000,000 g/mol.
6. The process of claim 1, wherein said weight average molecular weight is in 5 the range of 2,000,000-10,000,000 g/mol.
7. The process according to any one of claims 1-6, wherein said polyethylene has a polydispersity of less than 100.
- 10 8. The process according to any one of claims 1-6, wherein said polyethylene has a polydispersity of less than 50.
9. The process according to any one of claims 1-6, wherein said polyethylene has a polydispersity of less than 20.
- 15 10. The process according to any one of claims 1-6, wherein said polyethylene has a polydispersity of less than 10.
11. The process according to any one of claims 1-10, wherein said polyethylene 20 comprises less than 10 wt% comonomer.
12. The process according to any one of claims 1-10, wherein said polyethylene comprises up to 5 wt% comonomer.
- 25 13. The process according to any one of claims 1-12, wherein said polyethylene has a melting temperature of at least 115 °C.

14. The process according to any one of claims 1-12, wherein said polyethylene has a melting temperature of at least 135 °C.

5 15. The process according to any one of claims 1-14, wherein said process comprises subjecting said compacted polyethylene to a temperature above its crystalline melting temperature for not more than 60 minutes.

10 16. The process according to any one of claims 1-14, wherein said process comprises subjecting said compacted polyethylene to a temperature above its crystalline melting temperature for not more than 45 minutes.

15 17. The process according to any one of claims 1-14, wherein said process comprises subjecting said compacted polyethylene to a temperature above its crystalline melting temperature for not more than 15 minutes.

20 18. The process according to any one of claims 1-14, wherein said process comprises subjecting said compacted polyethylene to a temperature above its crystalline melting temperature for not more than 5 minutes.

19. The process according to any one of claims 1-18, wherein said temperature between room temperature and the crystalline melting temperature in steps (b) and (c) is at least 60°C.

20. The process according to any one of claims 1-18, wherein said temperature between room temperature and the crystalline melting temperature in steps (b) and (c) is at least 75°C.

5 21. The process according to any one of claims 1-18, wherein said temperature between room temperature and the crystalline melting temperature in steps (b) and (c) is at least 100°C.

10 22. The process according to any one of claims 1-18, wherein said polyethylene is compacted in step (c) at a pressure in the range of 10-200 MPa.

23. The process according to any one of claims 1-22, wherein said temperature above its crystalline melting temperature in step (d) is below 250°C.

15 24. The process according to any one of claims 1-22, wherein said temperature above its crystalline melting temperature in step (d) is below 190°C.

25. The process according to any one of claims 1-24, wherein said process further comprises post-treating said polyethylene after at least steps (a)-(d).

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26. The process according to claim 25, wherein said post-treating includes crosslinking said polyethylene.

27. An article obtained by the process according to any one of claims 1-26.

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28. The article of claim 27, wherein said article has a wear coefficient of less than  $3.5 \cdot 10^{-4} \text{ mm}^3/\text{mN}$ .
29. The article of claim 27, wherein said article has a wear coefficient of less than 5  $2.5 \cdot 10^{-4} \text{ mm}^3/\text{mN}$ .
30. The article of claim 27, wherein said article has a wear coefficient of less than  $2.2 \cdot 10^{-4} \text{ mm}^3/\text{mN}$ .
- 10 31. The article of claim 27, wherein said article has a wear coefficient of less than  $2.0 \cdot 10^{-4} \text{ mm}^3/\text{mN}$ .
- 15 32. The article according to any one of claims 27-31, wherein said article has a yield strength of at least 5 MPa.
33. The article according to any one of claims 27-31, wherein said article has a yield strength of at least 20 MPa.
- 20 34. The article according to any one of claims 27-33, wherein said article has a tensile strength of at least 10 MPa.
35. The article according to any one of claims 27-33, wherein said article has a tensile strength of at least 40 MPa.
- 25 36. The article according to any one of claims 27-35, wherein said article has an elongation at break of at least 30%.

37. An article obtained by subjecting polyethylene having a weight average molecular weight above 1,000,000 g/mol to a temperature above its melting temperature for a time less than 60 minutes, wherein said article has a wear coefficient of less than  $3.5 \cdot 10^{-4} \text{ mm}^3/\text{mN}$ .

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38. The article according to any one of claims 27-37, wherein said article is selected from the group consisting of artificial implants and orthopedic implants.

10 39. The article according to any one of claims 27-37, wherein said article is a sliding part.

40. Polyethylene having a weight average molecular weight of at least 1,000,000 g/mol and highly beneficial sintering characteristics.

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41. A composition comprising the polyethylene of claim 40.